

REMARKS

The Office Action dated September 29, 2004, has been carefully reviewed and the foregoing amendments and following remarks have been made in consequence thereof.

Claims 1-32 are pending in this application. Claims 1-4, 11, 13, 15-24, and 31 are rejected. Claims 5-10, 12, 14, 25-30, and 32 are objected to.

The objection to the specification is respectfully traversed. Specifically, the specification has been amended to recite "generator 70." Accordingly, for at least the reasons set forth above, Applicants respectfully request the objection to the specification be withdrawn.

The objection to the drawings is respectfully traversed. Specifically, Applicants respectfully submit that the output circuit recited in Claim 19 is shown in Figure 1, for example at item 142, which is described in the specification at paragraph [0028], lines 14-15 for example as, "[t]he impedance or gap values may be outputted via a digital-to-analog converter 140 to an analog output 142." Moreover, Applicants respectfully submit that the digital signal output recited in Claim 20 is also shown in Figure 1. The specification recites at paragraph [0028], for example, lines 10-12 that "[t]he calculated impedance may be converted by the processor 110 into a voltage or gap value correlative to the gap distance 29 between transducer 12 and target 30" and at paragraph [0029], for example, lines 1-2 that "[t]he impedance or gap values may be outputted through a communications link 144 to a host computer 146." Accordingly, for at least the reasons set forth above, Applicants respectfully request the objections to the drawings be withdrawn.

The rejection of Claims 1-4, 11, 13, 15-19, 21-24, and 31 under 35 U.S.C. § 102(b) as being anticipated by Danielson (U.S. Patent No. 5,541,510) is respectfully traversed.

Danielson describes a single eddy current coil (20) that is used to measure multiple parameters of a conductive target (22) simultaneously using a single fixed frequency. The system (10) includes a sensor coil (20), connecting cable (14), and signal conditioning

electronics (12) measuring the thickness of a target and the distance of the target from the coil.

Claim 1 recites a method for measuring the distance of a gap separating an eddy current transducer and a target wherein the method includes "determining a normalized impedance curve for the transducer...determining a time rate of change of the normalized impedance of the transducer along a line of constant gap...correcting an apparent gap magnitude using the determined time rate of change."

Danielson neither describes nor suggests a method for measuring the distance of a gap separating an eddy current transducer and a target wherein the method includes determining a normalized impedance curve for the transducer, determining a time rate of change of the normalized impedance of the transducer along a line of constant gap, and correcting an apparent gap magnitude using the determined time rate of change. Specifically, Danielson neither describes nor suggests a method that includes determining a time rate of change of the normalized impedance of the transducer along a line of constant gap. Rather, in contrast to the present invention Danielson describes curves that illustrate the normalized imaginary coil impedance versus the normalized real impedance of the sensor coil for specific cases of the mean radius of the sensor coil (r), the conductivity of the target material (σ), the permeability of the target material (μ), the excitation signal frequency (ω) and d (displacement) and arcs that represent the impedance of the probe located at a fixed gap as the frequency varies, but Danielson does not describe nor suggest determining a time rate of change of the normalized impedance of the transducer along a line of constant gap. For at least the reasons set forth above Claim 1 is submitted to be patentable over Danielson.

Claims 2-4 and 11 depend from independent Claim 1. When the recitations of Claims 2-4 and 11 are considered in combination with the recitations of Claim 1, Applicant submits that dependent Claims 2-4 and 11 likewise are patentable over Danielson.

Claims 5-10 and 12 were indicated as being allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims. As described above, Claim 1 is submitted to be in a condition for allowance.

Claims 5-10 and 12 depend from independent Claim 1 which is submitted to be in condition for allowance. When the recitations of Claims 5-10 and 12 are considered in combination with the recitations of Claim 1, Applicants submit that Claims 5-10 and 12 are likewise in condition for allowance.

Claim 13 recites a method for measuring a gap distance separating an eddy current transducer and a target wherein the method includes “calculating a complex electrical impedance value of the eddy current transducer at a plurality of gap distance values...normalizing the complex electrical impedance value...determining a time rate of change of the normalized impedance of the transducer along a line of constant gap...correcting an apparent gap magnitude using the determined time rate of change to facilitate reducing a contribution to the apparent gap by a magnetic field of the target.”

Danielson neither describes nor suggests a method for measuring a gap distance separating an eddy current transducer and a target wherein the method includes calculating a complex electrical impedance value of the eddy current transducer at a plurality of gap distance values, normalizing the complex electrical impedance value, determining a time rate of change of the normalized impedance of the transducer along a line of constant gap, and correcting an apparent gap magnitude using the determined time rate of change to facilitate reducing a contribution to the apparent gap by a magnetic field of the target. Specifically, Danielson neither describes nor suggests a method that includes determining a time rate of change of the normalized impedance of the transducer along a line of constant gap. Rather, in contrast to the present invention Danielson describes curves that illustrate the normalized imaginary coil impedance versus the normalized real impedance of the sensor coil for specific cases of the mean radius of the sensor coil (r), the conductivity of the target material (σ), the permeability of the target material (μ), the excitation signal frequency (ω) and d (displacement) and curves that correspond to lines of constant displacement, but Danielson

does not describe nor suggest determining a time rate of change of the normalized impedance of the transducer along a line of constant gap. For at least the reasons set forth above Claim 13 is submitted to be patentable over Danielson.

Claim 14 was indicated as being allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims. As described above, Claim 13 is submitted to be in a condition for allowance.

Claim 14 depends from independent Claim 13 which is submitted to be in condition for allowance. When the recitations of Claim 14 are considered in combination with the recitations of Claim 13, Applicants submit that Claim 14 is likewise in condition for allowance.

Claim 15 recites an apparatus for determining the distance of a gap between an eddy current transducer and a conductive target material wherein said apparatus includes "an eddy current transducer...a processor operatively coupled to said transducer, said processor configured to...generate a normalized impedance curve for said transducer and said target...determine a time rate of change of the transducer normalized impedance along a line of constant gap...correct an apparent gap magnitude using the determined time rate of change."

Danielson neither describes nor suggests an apparatus for determining the distance of a gap between an eddy current transducer and a conductive target material wherein the apparatus includes an eddy current transducer, a processor operatively coupled to the transducer, the processor configured to generate a normalized impedance curve for the transducer and the target, determine a time rate of change of the transducer normalized impedance along a line of constant gap, and correct an apparent gap magnitude using the determined time rate of change. Specifically, Danielson neither describes nor suggests an apparatus that includes a processor configured to determine a time rate of change of the transducer normalized impedance along a line of constant gap. Rather, in contrast to the present invention Danielson describes curves that illustrate the normalized imaginary coil

impedance versus the normalized real impedance of the sensor coil for specific cases of the mean radius of the sensor coil (r), the conductivity of the target material (σ), the permeability of the target material (μ), the excitation signal frequency (ω) and d (displacement) and curves that correspond to lines of constant displacement, but Danielson does not describe nor suggest determining a time rate of change of the normalized impedance of the transducer along a line of constant gap. For at least the reasons set forth above Claim 15 is submitted to be patentable over Danielson.

Claims 16-19 depend from independent Claim 15. When the recitations of Claims 16-19 are considered in combination with the recitations of Claim 15, Applicant submits that dependent Claims 16-19 likewise are patentable over Danielson.

Claim 21 recites a computer program embodied on a computer readable medium for determining the distance of a gap separating a eddy current transducer and a target wherein the program includes "a code segment that receives complex impedance information and then...determines a normalized impedance curve for the transducer...determines a time rate of change of the normalized impedance of the transducer along a line of constant gap...corrects an apparent gap magnitude using the determined time rate of change."

Danielson neither describes nor suggests a computer program embodied on a computer readable medium for determining the distance of a gap separating a eddy current transducer and a target wherein the program includes a code segment that receives complex impedance information and then determines a normalized impedance curve for the transducer, determines a time rate of change of the normalized impedance of the transducer along a line of constant gap, and corrects an apparent gap magnitude using the determined time rate of change. Specifically, Danielson neither describes nor suggests a program that includes a code segment that determines a time rate of change of the normalized impedance of the transducer along a line of constant gap. Rather, in contrast to the present invention Danielson describes curves that illustrate the normalized imaginary coil impedance versus the normalized real impedance of the sensor coil for specific cases of the mean radius of the sensor coil (r), the conductivity of the target material (σ), the permeability of the target

material (μ), the excitation signal frequency (ω) and d (displacement) and curves that correspond to lines of constant displacement, but Danielson does not describe nor suggest determining a time rate of change of the normalized impedance of the transducer along a line of constant gap. For at least the reasons set forth above Claim 21 is submitted to be patentable over Danielson.

Claims 22-24 and 31 depend from independent Claim 21. When the recitations of Claims 22-24 and 31 are considered in combination with the recitations of Claim 21, Applicant submits that dependent Claims 22-24 and 31 likewise are patentable over Danielson.

Claims 25-30 and 32 were indicated as being allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims. As described above, Claim 21 is submitted to be in a condition for allowance.

Claims 25-30 and 32 depend from independent Claim 21 which is submitted to be in condition for allowance. When the recitations of Claims 25-30 and 32 are considered in combination with the recitations of Claim 21, Applicants submit that Claims 25-30 and 32 are likewise in condition for allowance.

For at least the reasons set forth above, Applicants respectfully request that the rejection of Claims 1-4, 11, 13, 15-19, 21-24, and 31 under 35 U.S.C. 102(b) be withdrawn.

The rejection of Claim 20 under 35 U.S.C. § 103 as being unpatentable over Danielson in view of Slates (United States Patent 6,765,395) is respectfully traversed.

Danielson is described above. Slates describes a digital eddy current proximity system (10) that includes a proximity probe (12) for digitally measuring an impedance that is relative to a gap defined between the probe and a metallic target (T) being monitored. The system also includes a signal generator means (70), a timing control means (80), a sampling means (90), a digital convolution means (100), and a digital signal processor means (110). The signal generator includes a plurality of direct digital synthesis devices (72) that are

coupled to a resistance means (40) via a filter means (50) and a buffer, gain, and offset means (60) for driving a plurality of dynamic signals at different frequencies through the resistance means and the probe and for obtaining simultaneous impedance measurements of the probe at different frequencies relative to the gap.

Claim 20 depends indirectly from Claim 15, which recites an apparatus for determining the distance of a gap between an eddy current transducer and a conductive target material wherein said apparatus includes “an eddy current transducer...a processor operatively coupled to said transducer, said processor configured to...generate a normalized impedance curve for said transducer and said target...determine a time rate of change of the transducer normalized impedance along a line of constant gap...correct an apparent gap magnitude using the determined time rate of change.”

Applicants respectfully submit that Danielson and Slates, considered alone or in combination do not describe nor suggest the claimed invention. Specifically, neither Danielson nor Slates, considered alone or in combination describes or suggests an apparatus for determining the distance of a gap between an eddy current transducer and a conductive target material wherein the apparatus includes an eddy current transducer, a processor operatively coupled to the transducer, the processor configured to generate a normalized impedance curve for the transducer and the target, determine a time rate of change of the transducer normalized impedance along a line of constant gap, and correct an apparent gap magnitude using the determined time rate of change. More specifically, neither Danielson nor Slates, considered alone or in combination, describes or suggests an apparatus that includes a processor configured to determine a time rate of change of the transducer normalized impedance along a line of constant gap. Rather, in contrast to the present invention Danielson describes curves that illustrate the normalized imaginary coil impedance versus the normalized real impedance of the sensor coil for specific cases of the mean radius of the sensor coil (r), the conductivity of the target material (σ), the permeability of the target material (μ), the excitation signal frequency (ω) and d (displacement) and arcs that represent the impedance of the probe located at a fixed gap as the frequency varies and Slates describes

a digital eddy current proximity system that includes a cable-length calibration method, an automatic material identification and calibration method, a material insensitive method, an inductive ratio method and advanced sensing characteristics. For at least the reasons set forth above, Claim 15 is submitted to be patentable over Danielson in view of Slates.

Notwithstanding the above, Applicants respectfully submit that the Section 103 rejection of the presently pending claims is not a proper rejection. As is well established, obviousness cannot be established by combining the teachings of the cited art to produce the claimed invention, absent some teaching, suggestion, or incentive supporting the combination. Neither Danielson nor Slates, considered alone or in combination, describe or suggest the claimed combination. Furthermore, in contrast to the assertion within the Office Action, Applicants respectfully submit that it would not be obvious to one skilled in the art to combine Danielson with Slates, because there is no motivation to combine the references suggested in the art. Additionally, the Examiner has not pointed to any prior art that teaches or suggests to combine the disclosures, other than Applicants' own teaching. Rather, only the conclusory statement that "it would have been obvious to a person having ordinary skill in the art at the time the invention was made to provide Danielson with a display and an analog signal output as disclosed by Slates for the purpose of helping with the process of measuring a gap between a proximity robe and a conductive target material" suggests combining the disclosures.

As the Federal Circuit has recognized, obviousness is not established merely by combining references having different individual elements of pending claims. Ex parte Levengood, 28 U.S.P.Q.2d 1300 (Bd. Pat. App. & Inter. 1993). MPEP 2143.01. Rather, there must be some suggestion, outside of Applicants' disclosure, in the prior art to combine such references, and a reasonable expectation of success must be both found in the prior art, and not based on Applicant's disclosure. In re Vaeck, 20 U.S.P.Q.2d 1436 (Fed. Cir. 1991). In the present case, neither a suggestion nor motivation to combine the prior art disclosures, nor any reasonable expectation of success has been shown.

Furthermore, it is impermissible to use the claimed invention as an instruction manual or "template" to piece together the teachings of the cited art so that the claimed invention is rendered obvious. Specifically, one cannot use hindsight reconstruction to pick and choose among isolated disclosures in the art to deprecate the claimed invention. Further, it is impermissible to pick and choose from any one reference only so much of it as will support a given position, to the exclusion of other parts necessary to the full appreciation of what such reference fairly suggests to one of ordinary skill in the art. The present Section 103 rejection is based on a combination of teachings selected from multiple patents in an attempt to arrive at the claimed invention. Specifically, Danielson is cited for teaching a digital signal output, and Slates is merely cited for its teaching of a display and an analog signal output. Since there is no teaching nor suggestion in the cited art for the combination, the Section 103 rejection appears to be based on a hindsight reconstruction in which isolated disclosures have been picked and chosen in an attempt to deprecate the present invention. Of course, such a combination is impermissible, and for this reason alone, Applicants request that the Section 103 rejection be withdrawn.

In addition, as is well established, obviousness cannot be established by combining the teachings of the cited art to produce the claimed invention, absent some teaching, suggestion, or incentive supporting the combination. Neither Danielson nor Slates, considered alone or in combination, describe or suggest determining a time rate of change of the transducer normalized impedance along a line of constant gap.

If art "teaches away" from a claimed invention, such a teaching supports the nonobviousness of the invention. U.S. v. Adams, 148 USPQ 479 (1966); Gillette Co. v. S.C. Johnson & Son, Inc., 16 USPQ2d 1923, 1927 (Fed. Cir. 1990). In light of this standard, it is respectfully submitted that the cited art, as a whole, is not suggestive of the presently claimed invention. Moreover, Applicants respectfully submit that Danielson teaches away from Slates and the present invention, and as such, there is no suggestion or motivation to combine Slates with Danielson. Specifically, Slates describe a signal generator that includes a plurality of direct digital synthesis devices for driving a plurality of dynamic signals at

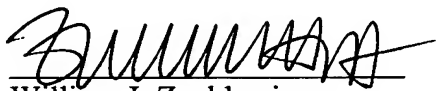
different frequencies through the resistance and the probe for obtaining simultaneous impedance measurements of the probe at different frequencies relative to the gap, and Danielson describes a single eddy current coil that is used to measure multiple parameters of a conductive target simultaneously using a single fixed frequency. For at least the reasons set forth above, Claim 15 is submitted to be patentable over Danielson in view of Slates

Claim 20 depends from independent Claim 15. When the recitations of Claim 20 are considered in combination with the recitations of Claim 15, Claim 20 is likewise submitted to be patentable over Danielson in view of Slates

For the reasons set forth above, Applicants respectfully requests that the Section 103 rejection of Claim 20 be withdrawn.

In view of the foregoing amendments and remarks, all the claims now active in this application are believed to be in condition for allowance. Reconsideration and favorable action is respectfully solicited.

Respectfully Submitted,



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